

Coincidence Summing Corrections

KORSUM II

Oliver Ott

Physikalisch-Technische Bundesanstalt

Department 6.1 Radioactivity

- Analytical calculation of the probabilities of full energy deposition in the detector for every transition of the decay scheme including K-X rays:
 1. taking summing-in and summing-out effects into account
 2. neglecting such effects
- Ratio of these two probabilities is the correction coefficient

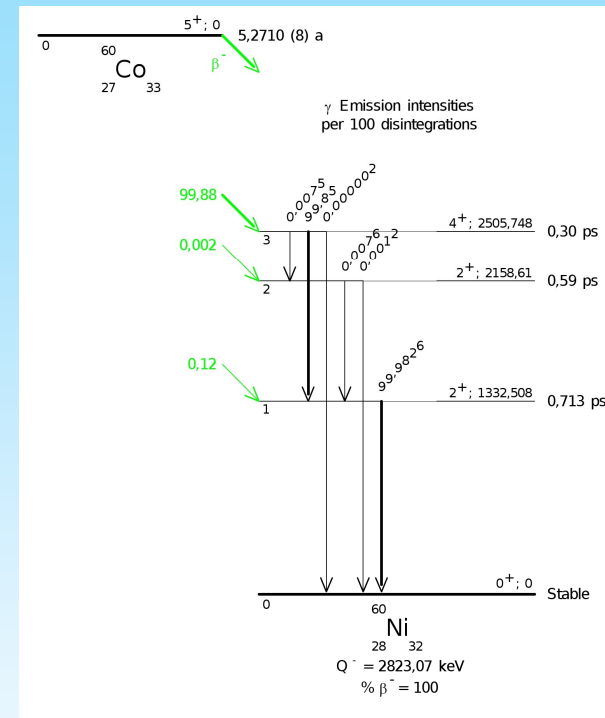
$$F_{ik} = N_i^P \cdot A_{ik}$$

$$S_{ik} = N_i \cdot A_{ik} \cdot M_{ik}$$

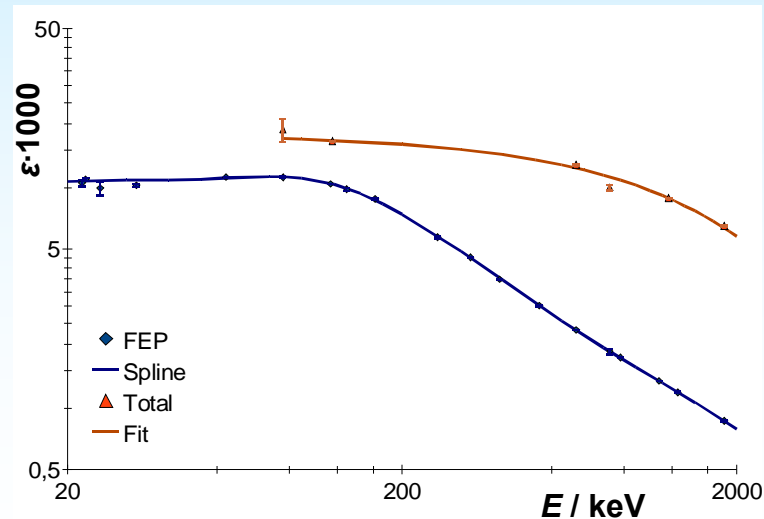
$$K\text{-Summ} = \frac{F_{ik}}{S_{ik}}$$

Input data

- **Nuclide data**
(E , N , p_y , α , p_K , ω_K)
from databases



Efficiencies ε at 10 cm (LNHB's G8)



Efficiency data from calibration measurements (Full Energy Peak and Total)

Bibliography



NUCLEAR INSTRUMENTS AND METHODS 158 (1979) 471-477 ; © NORTH-HOLLAND PUBLIS

G.J. McCallum and G.E. Coote

Influence of source-detector distance on relative intensity and angular correlation measurements with Ge(Li) spectrometers

Nuclear Instruments and Methods 130 (1975) 189-197

COINCIDENCE SUMMING CORRECTIONS IN Ge(Li)-SPECTROMETRY AT LOW SOURCE-TO-DETECTOR DISTANCES
KLAUS DEBERTIN and ULRICH SCHÖTZIG
Physikalisch-Technische Bundesanstalt, D-3300 Braunschweig, Germany

Received 7 July 1978

1. Introduction

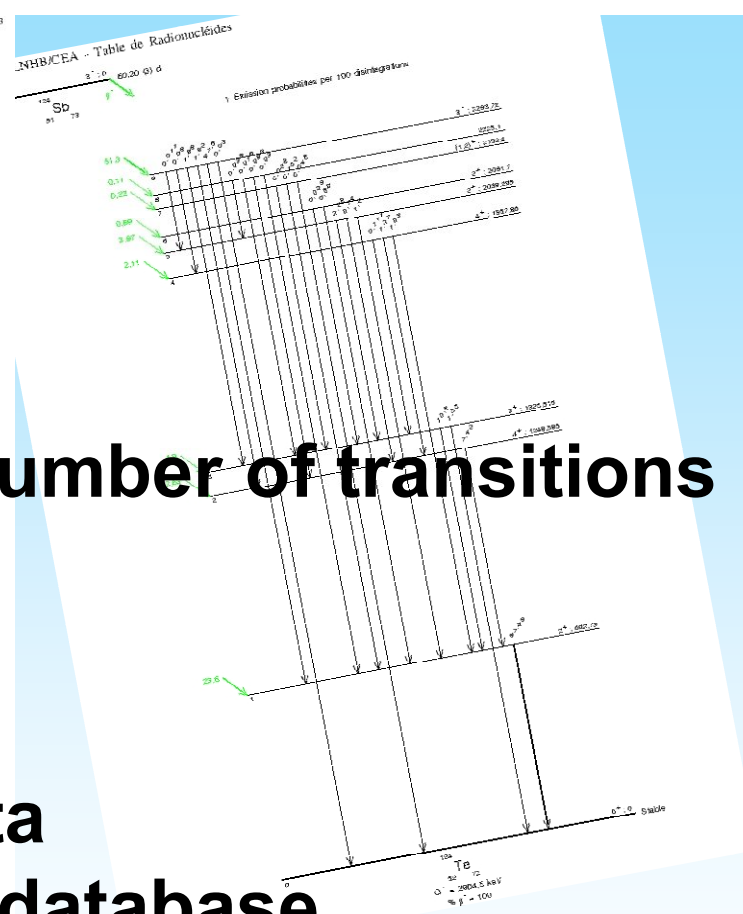
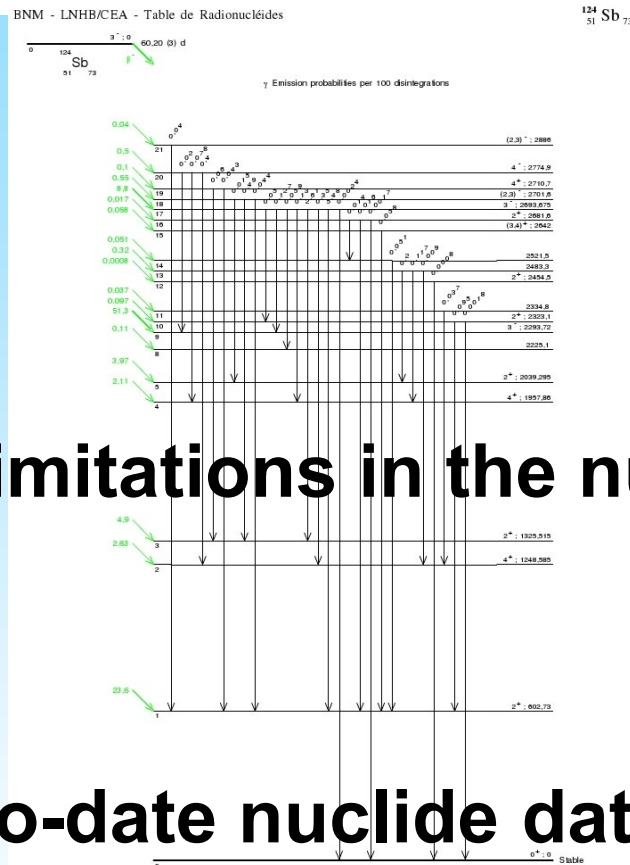
Ge(Li)-spectrometry is widely used for the determination of gamma-ray intensities. In the authors' experience, not yet been fully recognized sufficiently well by many laboratories. In a recent article, Gehrke et al.³⁾ tabulated the coincidence summing corrections for 13 radionuclides for a point source at 10 cm distance from a 65 cm³ Ge(Li)-detector. While the corrections in this case are typically of the order of one to two per cent, they can increase to 20-40% if the source is measured in close geometry. This work is intended to give a general impression of the possible order of magnitude of the coincidence summing correction factors as well as to provide quantitative figures in two measuring geometries frequently encountered in measurements of environmental radiation, particularly in the surveillance of air-borne radioactivity and of liquid waste. The corrections were determined experimentally for the three radionuclides ⁶⁰Co, ⁸⁸Y, ¹⁵²Eu. In addition, a computer program was written in order to calculate the corrections for nuclides with arbitrary decay scheme. The coincidence summing effects were studied with a cylindrical Ge(Li)-detector drifted coaxially with one end open. The closed end is facing the 0.5 mm thick aluminium window of the detector housing at a distance of 6 mm. The detector is 43 mm in diameter and 46.5 mm in length, with a p-core 10 mm in diameter. This corresponds to an active volume of about 64 cm³. Two measuring geometries were considered: the first case point source

Klaus Debertin and Ulrich Schötzig

Coincidence summing corrections in Ge(Li)-spectrometry at low source-to-detector distances

Nuclear Instruments and Methods 158 (1979) 471-477

Improvements of KORSUM II



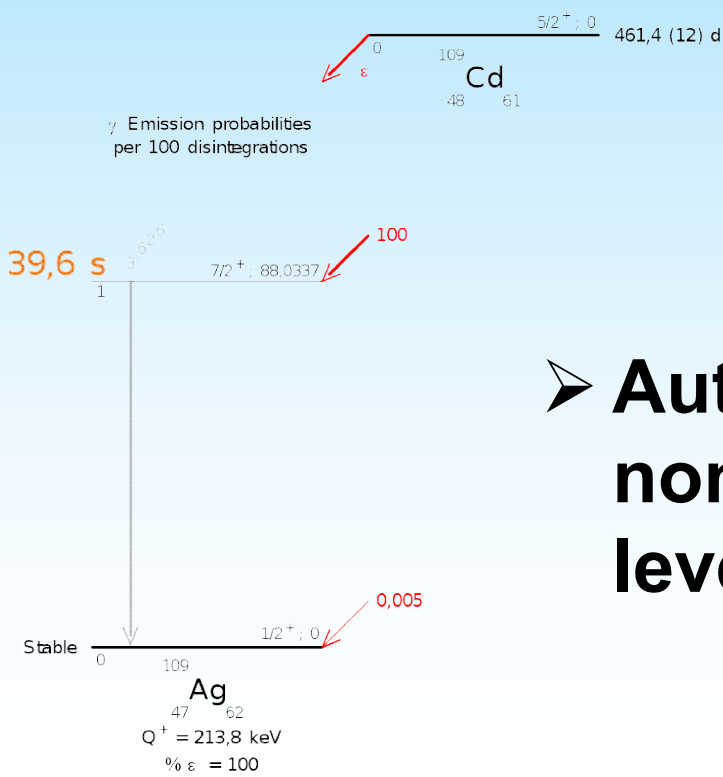
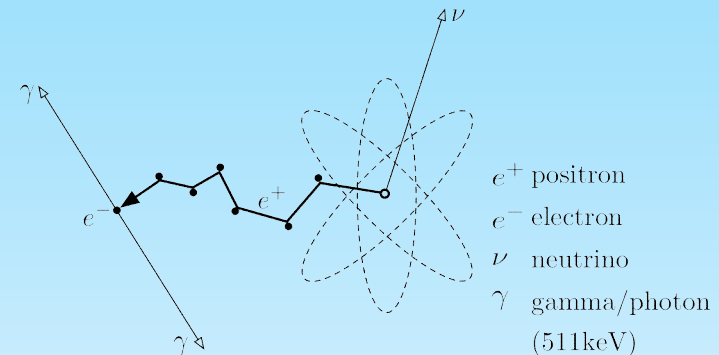
➤ No limitations in the number of transitions

➤ Up-to-date nuclide data
via Nuclide database



Improvements in KORSUM II

➤ Automatic inclusion of annihilation radiation



➤ Automatic identification of non-coincident long-lived levels

Thank you